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STUDY OF PESTICIDES IN SHELLFISH AND
ESTUARINE AREAS OF LOUISIANA

R. J. Hammerstrom, et al

National Center for Urban and Industrial Health
Cincinnati, Ohio

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Gulf Coast Shellfish Sanitation Research Center

in cooperation with

Louisiana State Board of Health
Louisiana Wild Life and Fisheries Commission
Louisiana Stream Control Commission

and

Federal Water Pollution Control Administration

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Preface

With the reoccurrence in late 1963 of major fish kills in the Lower Mississippi River, Louisiana State agencies were joined by agencies of the U.S. Government to extend investigations conducted by the State over the preceding years and to undertake additional studies to determine the causative agent of the fish mortalities. With the incrimination of pesticides as the primary causative agent, a number of State and Federal agencies became engaged in the study of the fish kills in relation to agriculture, fisheries, public health, and other interests. This technical report includes the results of part of an overall study of pesticides in shellfish and estuarine areas and represents only the investigations conducted by the Gulf Coast Shellfish Sanitation Research Center of the U.S. Public Health Service. These investigations were conducted in cooperation with the Louisiana State Board of Health, the Louisiana Wild Life and Fisheries Commission, and the Louisiana Stream Control Commission and were supported in part by funds provided by the Lower Mississippi River Technical Assistance Project of the Federal Water Pollution Control Administration.

RICHARD J. HAMMERSTROM

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The cooperation and assistance of the Louisiana State Board of Health, the Louisiana Wild Life and Fisheries Commission, and the Louisiana Stream Control Commission in the conduct of this study are gratefully acknowledged. Appreciation is extended to Dr. George H. Hauser, Mr. John E. Trygg, and Mr. Leo W. Spath of the State Board of Health; Dr. Lyle S. St. Amant and Dr. Theodore B. Ford of the Wild Life and Fisheries Commission; and Mr. Robert A. Lafleur of the Stream Control Commission for their continuing assistance in the planning of this project, evaluation of results, and counseling on study activities. Special credit is due to Mr. Joseph A. D'Alfonso of the State Board of Health for his very helpful participation and especially his untiring efforts in sample collection throughout the study. The use of the boats and operating personnel of the Wild Life and Fisheries Commission in the field sampling activities is recognized as a significant contribution to this project and is deeply appreciated.

The financial support provided by the Federal Water Pollution Control Administration and the cooperation and assistance of Mr. George J. Putnicki, Project Director, Lower Mississippi River Technical Assistance Project, and members of his staff, during the course of this study are also gratefully acknowledged.

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Summary and Conclusions

Following the recurrence of major fish kills in the Lower Mississippi River and the adjacent waters of the Gulf of Mexico in Louisiana during the fall and early winter of 1963, the Gulf Coast Shellfish Sanitation Research Center, in December 1963, initiated investigations of the public health implications of the problem as related to shellfish and other marine food resources. These studies were carried out in cooperation with the Louisiana State Board of Health, the Louisiana Wild Life and Fisheries Commission, and the Louisiana Stream Control Commission.

During the period January to March 1964, the Research Center conducted laboratory examinations for marine toxins, heavy metals, pesticides, and microbial organisms on oyster, water, bottom sediment, finfish, and shrimp samples collected by personnel of the cooperating agencies from oyster growing areas in the Lower Mississippi River region and in the Calcasieu Lake area. Following the report in March 1964 of the Robert A. Taft Sanitary Engineering Center, that two pesticides, endrin and dieldrin, had been found in dead and dying fish in the water environment associated with the fish kills in the Lower Mississippi River, the Gulf Coast Research Center placed primary emphasis on the laboratory examination of samples for dieldrin, endrin, and other chlorinated pesticides and discontinued examination of samples for other possible contaminants.

In October 1964, the ongoing cooperative study with the Louisiana State agencies was extended to include the Gulf Coast Research Center's participation in the Lower Mississippi River Technical Assistance Project with financial support provided by the Division of Water Supply and Pollution Control of the U.S. Public Health Service. The collection of oyster, water, and bottom sediment samples was then confined to the Lower Mississippi River region and southern Barataria Bay.

Field sampling activities were conducted during three separate time periods, as follows: January 7 through September 29, 1964, (Sampling Period A); November 10, 1964, through June 23, 1965, (Sampling Period B); and October 13, 1965, through June 15, 1966, (Sampling Period C).

Improvements in analytical techniques and instrumentation resulted in increasing sensitivity of analyses and lower levels of reporting pesticide con-

centrations as the study progressed. The reporting levels of pesticide concentration for Sampling Period A were 0.01 ppm for oysters and bottom sediment samples and 0.001 ppm for water samples. Concentrations of pesticides below these reporting levels could not be confirmed by the analytical techniques utilized for samples collected during Sampling Period A. The reporting levels of pesticide concentration for Sampling Periods B and C were less than 0.01 ppm for oyster and bottom sediment samples and less than 0.001 ppm for water samples.

The major interest of the participating agencies in this study was concerned with the findings of endrin and dieldrin in the various types of samples analyzed. Special attention was also given to the frequency and levels of concentration at which DDT and its metabolites DDD and DDE were found. The highest levels of concentration of these pesticides are summarized for the entire study for all samples of each type. The median values of pesticide concentration, however, are summarized only for Sampling Periods B and C for the positive samples of each type. Positive samples during Sampling Periods B and C are defined as oyster and bottom sediment samples containing <0.01 ppm and higher concentrations and water samples containing <0.001 ppm and higher concentrations. Since pesticide concentrations during Sampling Period A were reported at levels of 0.01 ppm for oyster and bottom sediment samples and 0.001 ppm for water samples, median values for Sampling Period A that would be comparable to median values for Sampling Periods B and C could not be determined.

The highest concentration of endrin found in oyster samples was 0.07 ppm with the median value being <0.01 ppm. The highest concentrations of endrin found in water and bottom sediment samples were <0.001 ppm and 0.01 ppm, respectively, with median values being <0.001 ppm for water samples and <0.01 ppm for bottom sediment samples.

The highest concentration of dieldrin found in oyster samples was 0.09 ppm with the median value being <0.01 ppm. The highest concentrations of dieldrin found in water and bottom sediment samples were <0.001 ppm and 0.02 ppm, respectively, with median values being <0.001 ppm for water samples and <0.01 ppm for bottom sediment samples.

DDT (pp') and its metabolites DDD and DDE were found most frequently and at the highest levels

in the samples examined. The highest concentration of total DDT, comprised of DDT (pp'), DDD, and DDE, in oyster samples was 0.46 ppm with the median value being 0.04 ppm. The highest concentrations of total DDT found in water and bottom sediment samples were 0.002 ppm and 0.30 ppm, respectively, with median values being <0.001 ppm for water samples and 0.01 for bottom sediment samples. The greater frequency and generally higher levels at which DDT (pp'), DDD, and DDE were found in comparison to all other pesticides is not considered unusual in view of the widespread use of DDT for agricultural and other purposes and the extensive occurrence of this pesticide throughout our environment.

Introduction

The fish kills in the Mississippi River in recent years have caused growing concern over the condition of the water, especially in the lower reaches of the River, and the possible effects on marine food resources. The public health aspects of pesticides in the water and in shellfish taken from estuarine areas influenced by the water are readily apparent, especially considering the oyster's capability of concentrating toxic materials from the surrounding environment and the fact that oysters are commonly eaten raw. There was concern also with regard to the quality of the River water in relation to the conservation aspects of estuarine areas. These estuarine areas contain vast acreages of oyster growing bottoms. In addition, they also serve as nursery grounds for shrimp and many species of commercially valuable finfish.

The fish kill problem became apparent in the autumn and winter of 1960 when the first severe kill occurred. Additional kills occurred in the autumns and winters of 1961 and 1962 though not as severe as the 1960 kill. The kill of 1963, beginning in September and extending into 1964, was quite severe. Additional fish kills have been reported in several areas of the State more recently, but no major fish kill was reported in the Lower Mississippi River during the autumns and winters of 1964-65 and 1965-66.

Field Sampling Activities

Field sampling activities during the overall study were carried out during three separate time periods in relation to sampling stations used. The first

The results of the laboratory analyses of all oyster, water, and bottom sediment samples collected during the entire study showed that, in general, chlorinated pesticides were either not detected or were found in very low levels.

The ranges of the pesticide levels in all oyster samples were generally of the same magnitude as those found by the U.S. Food and Drug Administration in 1964 and 1965 in the analyses of 216 composite samples of 12 major food groups comprising the American food supply. The amounts of the pesticide residues found by the Food and Drug Administration were reported as insignificant from a health standpoint (1,2).

In January and February of 1964, Research Center staff members made sampling trips to the oyster growing areas in the Lower Mississippi River region to collect oyster, water, and fish samples for laboratory analyses. Bioassays of the water samples and of extracts of the fish samples showed evidence that a toxic agent was present. No clue as to the exact identity of the toxin and/or toxins was immediately ascertained.

Following the report in March 1964 of the Public Health Service of the findings by the Robert A. Taft Sanitary Engineering Center on the presence of endrin and dieldrin in dead and dying fish taken from Mississippi River waters, a study of the fish kill problem was formalized in cooperation with the Louisiana State Board of Health, the Louisiana Wild Life and Fisheries Commission, and the Louisiana Stream Control Commission. The study had as its principal objective the determination of the presence and possible buildup of chlorinated pesticides in shellfish and other marine food resources for man. Primary emphasis was placed on the laboratory examination of oyster, water, and bottom sediment samples, collected from major oyster growing areas of the State, for the chlorinated pesticides—aldrin, BHC-lindane, chlordane, DDD, DDE, DDT (pp'), dieldrin, endrin, heptachlor, heptachlor-epoxide, methoxychlor, and toxaphene.

sampling period, Sampling Period A, included the initial phases of the study and extended from January 7 through September 29, 1964. The second

sampling period, Sampling Period B, extended from November 10, 1964, through June 23, 1965. The third and final sampling period, Sampling Period C, extended from October 13, 1965, through June 15, 1966.

The sampling areas and sampling stations listed in Table 1 and shown on the accompanying map, Figure 1, were selected for Sampling Period A because they were all considered important oyster growing areas, or, as in the case of the Mississippi River, strategic control stations for the purposes of the study.

Random sampling was carried out in the Lower Mississippi River region to obtain information regarding the possible fish kill causative agent and/or agents and to determine the effect of this agent on oysters since several fish kills were reported to have occurred over oyster beds. During January 5-10 and again during January 29-February 1, 1964, a Research Center staff member made sampling trips to the oyster growing areas in this region to make field observations and to collect oyster, water, and fish samples for laboratory analyses for the presence of toxic agents.

Following the establishment of the cooperative study with the Louisiana State Agencies in March 1964, sampling activity was intensified and more comprehensive laboratory investigations were initiated. Emphasis was placed upon the establishment of representative sampling points to cover the four major oyster growing areas designated by the Louisiana State Board of Health as Area I, Area II, Area III-A, and Area III-B, and the area immediately southeast of Areas II and III-A, referred to as the Mississippi River Delta area, as shown in Figure 1. The oyster growing beds affected included areas near lakes or siphons from which river water could be introduced onto the oyster beds or areas that indirectly receive water drifting back from the passes at the mouth of the Mississippi River. Calcasieu Lake, designated as Area VII, was also included in the original sampling area since it is a major oyster growing area receiving runoff from the rice and cane

fields to the north. The Mississippi River at Olga was used as a sampling station for water and bottom sediment samples.

With the initiation of the Gulf Coast Research Center's participation in the Lower Mississippi River Technical Assistance Project of the Public Health Service Division of Water Supply and Pollution Control in October of 1964, oyster sampling stations were selected which were considered by all concerned as representing the most important growing areas from the standpoint of yielding information concerning the level or possible buildup of pesticides. During Sampling Period B oyster, water, and bottom sediment samples were collected from Station B, Long Bay; and Station Z, Ostrica Canal at Quarantine Bay in Area II; Four Bayou, Four Bayou Pass; Station M-1, Adams Bay; and Station Q, Bastian Bay in Area III-A; and Bird Island Reef; Sugar Bend Reef; and Middle Bank Light in Barataria Bay in Area III-B. Water and bottom sediment samples were collected also from the Mississippi River at Empire, Louisiana.

It was planned that the same sampling stations used during Sampling Period B would continue to be used for the remainder of the study during Sampling Period C. However, Hurricane Betsy which struck the Lower Mississippi River region on September 9, 1965, devastated the oyster reefs at Four Bayou Pass and at Bird Island Reef and Middle Bank Light. Sampling of these stations was discontinued soon after the beginning of Sampling Period C, and two new stations, Bay des Ilettes and Cat Bay Light, were established at that time in Area III-B.

The sampling stations used during Sampling Periods B and C are listed in Table 2 and shown on the accompanying map, Figure 2. The sampling schedule for these two periods was revised to provide for planned bimonthly collection of oyster, water, and bottom sediment samples from these stations. However, adverse weather conditions and other extenuating circumstances prevented close adherence to this schedule.

Field Sampling Procedures

During Sampling Period A, samples were acquired in various ways. Oyster samples were either collected directly from the oyster growing areas by representatives of the participating agencies in the study or purchased from oyster dealers who verified

the general location of the sampling site. Water and bottom sediment samples were collected directly by representatives of the participating agencies. The few fish and shrimp samples were collected directly by representatives of the participating agen-

Table 1—Sampling Areas and Sampling Stations— Sampling Period A¹

***AREA I**

Drum Bay
Lake Borgne

***AREA II**

American Bay
California Bay
Quarantine Bay
Grand Bay
Mississippi River, Olga

***MISSISSIPPI RIVER DELTA AREA**

Johnson Pass
Redfish Bay

***AREA III A**

*Station J, Sandy Point Bay
*Station H, Bay Coquette
*Station D, Skipjack Bay
*Station M-1, Adams Bay
*Station R, Bastian Bay
*Station S, Bastian Bay—Grand Bayou
*Station Y, Cat Bay
*Four Bayou, Four Bayou Pass

***AREA III B**

*Station K, Barataria Bay
*Station E, Northwestern Barataria Bay

***AREA VII**

*Station V, Calcasieu Lake
*Station E, Calcasieu Lake

¹ Period of sampling—January 7 through September 29, 1964.

*Note: Area and station designations are those used by the Louisiana State Board of Health.

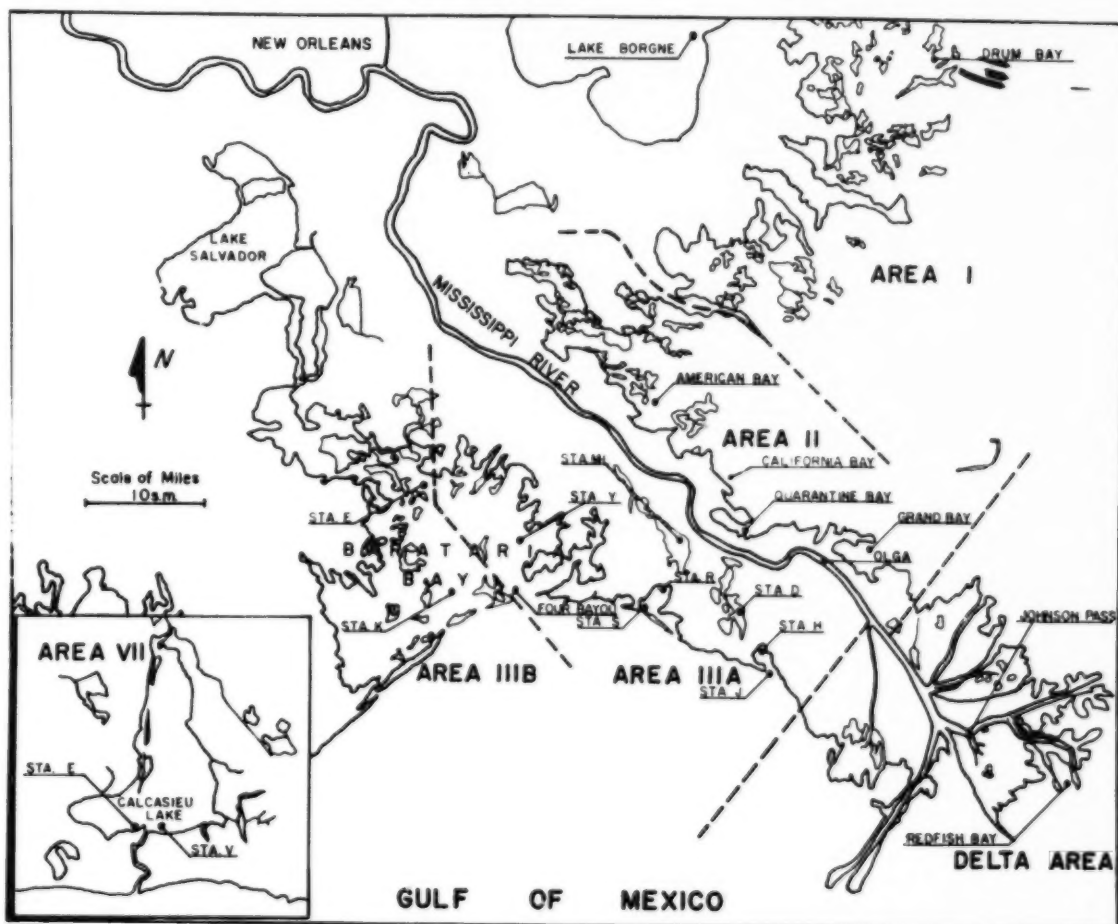


Figure 1

Table 2—Sampling Areas and Sampling Stations—Sampling Periods B and C¹

***AREA II**

*Station B, Long Bay

*Station Z, Ostrica Canal at Quarantine Bay

***AREA III A**

*Mississippi River, Empire Water Station

*Station M-1, Adams Bay

*Station Q, Bastian Bay

*Four Bayou, Four Bayou Pass

***AREA III B**

*Middle Bank Light, Barataria Bay

*Cat Bay Light, Barataria Bay

*Sugar Bend Reef, Barataria Bay

*Bird Island Reef, Barataria Bay

*Bay des Ilettes, Barataria Bay

¹ Periods of sampling—November 10, 1964, through June 23, 1965, and October 13, 1965, through June 15, 1966.

*Note: Area and station designations are those used by the Louisiana State Board of Health.

*Note: Stations established after Hurricane Betsy devastated reefs at Four Bayou Pass, Middle Bank Light, and Bird Island Reef.

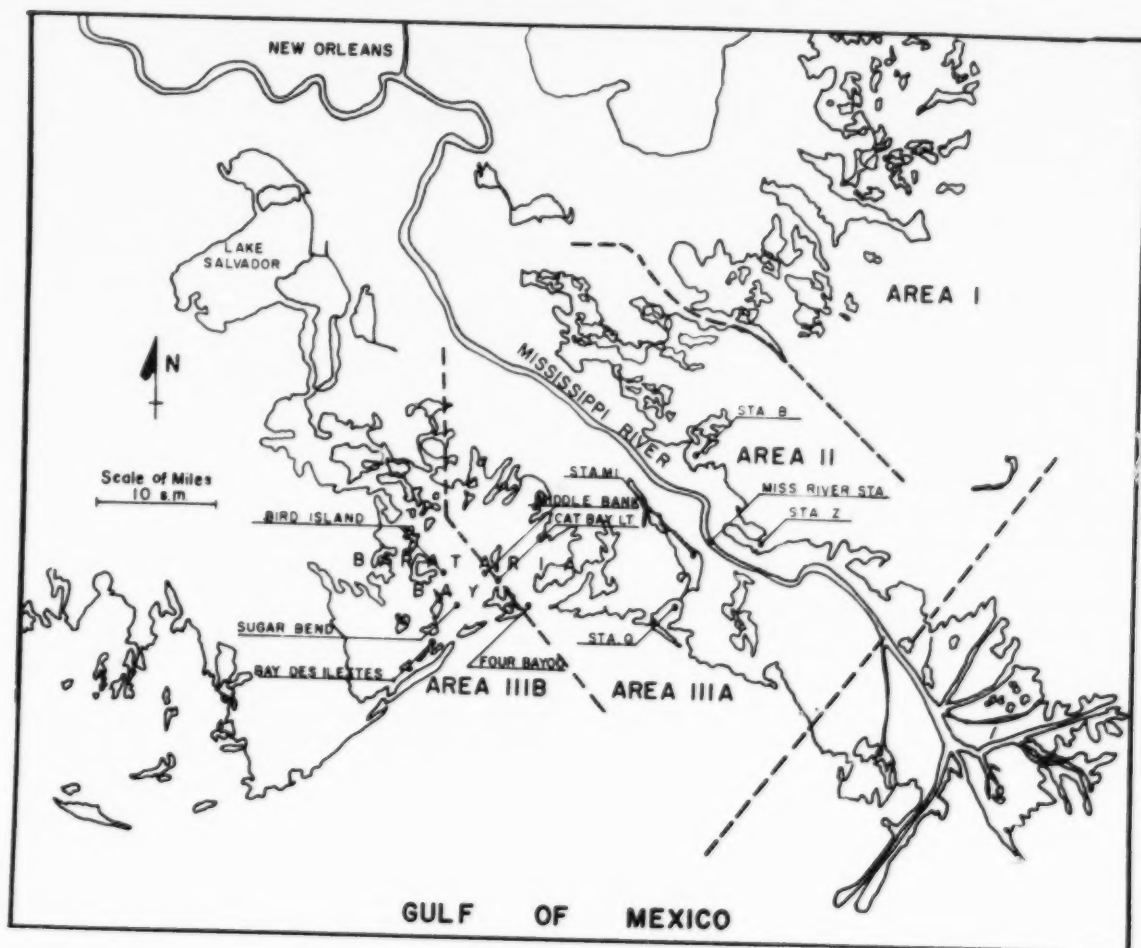


Figure 2

cies or acquired from fishermen. During Sampling Periods B and C, all samples were collected directly by representatives of the participating agencies.

Field sampling of all stations in oyster growing waters by representatives of the participating agencies was accomplished through the use of boats and

appropriate sampling equipment. Sampling of the Mississippi River at Olga was accomplished through the use of a boat and at Empire from the pier of the Empire Water Works.

Oyster samples were collected with a 12-tooth dredge operated manually. Approximately 40 oysters were collected at each station.

Bottom sediments were collected during the initial phases of the study with a Petersen dredge and later with a bottom sampler developed for the study. The sampler consisted of a one liter steel cylinder open at one end. It was harnessed to a towing line

and was towed behind a boat by a line equal in length to three times the depth of the water. A one-half kilogram lead weight attached to the line 30 centimeters ahead of the cylinder caused the lip of the sampler to dig into the top 2 to 4 centimeters of the bottom sediments. After retrieving the sampler, one-half liter of bottom sediment was available for analysis.

Water samples were collected directly into chemically clean glass bottles by immersing the bottles immediately below the surface of the water. A four liter sample was collected at each station.

Laboratory Investigations

The laboratory investigations conducted by the Research Center initially included the use of several different analytical methods or techniques in an attempt to solve the problem of the Mississippi River fish kill. These investigations included the use of bioassay methods and feeding experiments using brine shrimp (*Artemia salina*), mice, and native fish (*Mollicentia latipinna*); chemical analysis for chlorinated pesticides; polarography for heavy metals analyses; and microbiological examination for bacteria or fungi toxic to fish.

The microbiological studies, which were negative in all respects, and the heavy metals analyses and bioassays were discontinued in early March 1964 with the reporting by the Robert A. Taft Sanitary Engineering Center of chlorinated pesticides as the principal causative agent of the fish kills. The efforts of the Research Center were then directed to chemical analyses for chlorinated pesticides using electron capture gas chromatography with thin-layer chromatography for confirmation of analyses of oyster and bottom sediment samples. Emphasis was placed upon improvement and development of techniques.

The methods and procedures used in the laboratory investigations were from among those compiled by the Food and Drug Administration³ with the confirmatory procedure of Kovacs.⁴ The methods were amended as needed to achieve reliable results with the equipment and techniques utilized at the Gulf Coast Research Center.⁵

Electron capture gas chromatography was used for both qualitative and quantitative determination

of the chlorinated pesticide residues. Thin-layer chromatography, initially used for confirmation of results obtained from oyster and bottom sediment samples, was replaced in March 1965 by use of microcoulometric gas chromatography. Beginning in April 1966, the analytical results were confirmed by dual column electron capture chromatography following the procedure of Burke and Holswade.⁶

Standard mixtures containing the pesticides were injected into the gas chromatograph each day before any sample injection as well as during the course of injection of samples for residue determinations. Standards were also injected after any sample yielding significant pesticide residues. Collaborative laboratory analyses were conducted from time to time with other research laboratories for substantiation of methods.

The sensitivity and specificity of laboratory analyses of oyster, water, and bottom sediment samples for chlorinated pesticides increased as the study progressed from the early through the final phases. This increase in sensitivity and specificity was achieved through the acquisition of new equipment and also reflected the general rapid technical improvements made during this period in instrumentation and progress in development and adaptation of pesticide analytical techniques.

Residues are reported in parts per million (micrograms/gram) of drained weight for oysters, fish, and shrimp samples, and of settleable solids for bottom sediment samples. Residues are reported in parts per million (milligrams/liter) for water samples.

Results and Analysis of Data

The results of analyses of samples are presented and discussed under two separate phases of the study because of the different levels of reporting pesticide concentrations. The first phase includes the time period January 7 through September 29, 1964, (Sampling Period A), and the second phase includes the remainder of the study conducted during the time periods November 10, 1964, through June 23, 1965, and October 13, 1965, through June 15, 1966, (Sampling Periods B and C).

Findings of pesticides in oyster, bottom sediment, fish, and shrimp samples collected during Sampling Period A are reported at levels of 0.01 ppm or greater. All such samples having pesticides in trace amounts of <0.01 ppm or in non-detectable levels were not reported because analytical techniques and instrumentation used at that time in the study did not permit confirmation of the pesticides at these lower levels. Findings of pesticides in water samples collected during Sampling Period A are reported at levels of 0.001 ppm or greater. All such samples having pesticides in trace amounts of <0.001 ppm or in non-detectable levels were not reported for the same reason given above.

Findings of pesticides in oyster and bottom sediment samples collected during Sampling Periods B and C are reported at levels of less than 0.01 ppm or greater. Results of analyses of oyster and bottom sediment samples in which pesticides were not found are reported as not detected. Findings of pesticides in water samples collected during Sampling Periods B and C are reported at levels of less than 0.001 ppm or greater. Results of analyses of water samples in which pesticides were not found are reported as not detected.

A summary tabulation of the findings of pesticides in the samples collected during Sampling Period A is presented in Table 3. The pesticide levels found in the samples are given in greater detail in Appendices A through D and are summarized as follows:

OYSTER ANALYSES (Appendix A): Eighteen of the 43 oyster samples were found to contain one or more of the chlorinated pesticides at levels of 0.01 ppm or greater. Aldrin was found in one sample at a 0.01 ppm level, DDE was found in 18 samples in the range of 0.01 to 0.03 ppm, and DDT (pp') in 13 samples in the range of 0.01 to 0.04 ppm. Dieldrin and endrin were found at a level of 0.01 ppm in 5 and 4 samples, respectively.

WATER ANALYSES (Appendix B): Three of the 25 water samples were found to contain one or more of the chlorinated pesticides at levels of 0.001 ppm or greater. All of these were from the station at Olga on the Mississippi River. BHC-lindane was found in one sample at a level of 0.02 ppm and DDT (pp') in 2 samples in the range of 0.001 to 0.002 ppm.

BOTTOM SEDIMENT ANALYSES (Appendix C): Six of the 21 bottom sediment samples were found to contain one or more of the chlorinated pesticides at levels of 0.01 ppm or greater. DDE was found in 5 samples and DDT (pp') in 6 samples in the range of 0.01 to 0.05 ppm.

FISH AND SHRIMP ANALYSES (Appendix D): Six samples of finfish and shrimp were analyzed for chlorinated pesticides. Four of these samples were found positive for one or more pesticides at levels of 0.01 ppm or greater. DDE was found in three samples in the range of 0.01 to 0.04 ppm, DDT

Table 3—Chlorinated Pesticides in Samples Collected During Sampling Period A

Sample Type	Number of samples							
	Examined ¹	Positive for One or More Pesticides	Positive ² for					
			Aldrin	BHC-lindane	DDE	DDT (pp')	Dieldrin	Endrin
Oyster.....	43	18	1	0	18	13	5	4
Water.....	25	3	0	1	0	2	0	0
Bottom Sediment.....	21	6	0	0	5	6	0	0
Fish & Shrimp.....	6	4	0	0	3	1	0	1

¹ All samples examined for aldrin, BHC-lindane, chlordane, DDD, DDE, DDT (pp'), dieldrin, endrin, heptachlor, heptachlor-epoxide, methoxychlor, and toxaphene.

² At levels of 0.01 ppm or greater for oyster, bottom sediment, and fish and shrimp samples and at levels of 0.001 ppm or greater for water samples.

(pp') in one sample at a level of 0.02 ppm, and heptachlor in one sample at a level of 0.01 ppm.

Summary tabulations of the findings of pesticides in the samples collected during Sampling Periods B and C are presented in Tables 4, 5, and 6. The pesticide levels found in the samples are given in greater detail in Appendices E through H and are summarized as follows:

OYSTER ANALYSES (Appendices E and H): All of the 145 oyster samples examined were found to contain one or more chlorinated pesticides. For each pesticide and for total DDT, comprised of DDT (pp'), DDD, and DDE, the number of oyster samples in which the pesticide was detected and the median, low, and high values of pesticide concentration in ppm, are shown in Table 4. The high values of pesticide concentration in all oyster samples ranged from <0.01 ppm for aldrin and heptachlor to 0.40 ppm for DDT (pp'). The highest concentrations of endrin and dieldrin found in the oyster samples were 0.07 ppm and 0.09 ppm, respectively. The highest concentration of total DDT was 0.46 ppm. The median value of pesticide concentration was <0.01 ppm for all pesticides except DDD and DDT (pp') for which the median value was 0.01 ppm. The median value for total DDT was 0.04 ppm. The low value of pesticide concentration was <0.01 ppm for all pesticides, including total DDT.

Table 4—Chlorinated Pesticide Residues in All 145 Positive Oyster Samples Collected During Sampling Periods B and C¹

Pesticide	No. Samples Positive for Pesticide Shown	Residue (ppm drained weight)		
		Median	Low	High
Aldrin	11	<0.01	<0.01	<0.01
BHC-lindane	39	<0.01	<0.01	0.02
Chlordane	78	<0.01	<0.01	0.03
DDD	143	0.01	<0.01	0.07
DDE	144	<0.01	<0.01	0.06
DDT (pp')	137	0.01	<0.01	0.40
Total DDT*	144	0.04	<0.01	0.46
Dieldrin	128	<0.01	<0.01	0.09
Endrin	110	<0.01	<0.01	0.07
Heptachlor	8	<0.01	<0.01	<0.01
Heptachlor-Epoxide	19	<0.01	<0.01	0.01
Methoxychlor	9	<0.01	<0.01	0.02
Toxaphene	0			

¹ Periods of sampling—November 10, 1964, through June 23, 1965, and October 13, 1965, through June 15, 1966.

*Total DDT comprised of DDT (pp'), DDD, and DDE.

WATER ANALYSES (Appendices F and H): Of the 184 water samples collected during Sampling

Periods B and C, 158 samples were found to contain one or more chlorinated pesticides. For each pesticide and for total DDT, comprised of DDT (pp'), DDD, and DDE, the number of water samples in which the pesticide was detected and the median, low, and high values of pesticide concentration in ppm are shown in Table 5. The high value of pesticide concentration in all positive water samples was <0.001 ppm for all pesticides except for BHC-lindane and DDT (pp'). The high values for BHC-lindane and DDT (pp') were 0.001 ppm and 0.002 ppm, respectively. The highest concentration of total DDT was 0.002 ppm. The median and low values of pesticide concentration were <0.001 ppm for all pesticides, including total DDT.

Table 5—Chlorinated Pesticide Residues in All 158 Positive Water Samples Collected During Sampling Periods B and C¹

Pesticide	No. Samples Positive for Pesticide Shown	Residue (ppm)		
		Median	Low	High
Aldrin	4	<0.001	<0.001	<0.001
BHC-Lindane	36	<0.001	<0.001	0.001
Chlordane	75	<0.001	<0.001	<0.001
DDD	121	<0.001	<0.001	<0.001
DDE	143	<0.001	<0.001	<0.001
DDT (pp')	123	<0.001	<0.001	0.002
Total DDT*	151	<0.001	<0.001	0.002
Dieldrin	66	<0.001	<0.001	<0.001
Endrin	77	<0.001	<0.001	<0.001
Heptachlor	8	<0.001	<0.001	<0.001
Heptachlor-Epoxide	4	<0.001	<0.001	<0.001
Methoxychlor	7	<0.001	<0.001	<0.001
Toxaphene	0			

¹ Periods of sampling—November 10, 1964, through June 23, 1965, and October 13, 1965, through June 15, 1966.

*Total DDT comprised of DDT (pp'), DDD, and DDE.

BOTTOM SEDIMENT ANALYSES (Appendices G and H): Of the 184 bottom sediment samples collected during Sampling Periods B and C, 177 samples were found to contain one or more chlorinated pesticides. For each pesticide and for total DDT, comprised of DDT (pp'), DDD, and DDE, the number of bottom sediment samples in which the pesticide was detected and the median, low, and high values of pesticide concentration in ppm are shown in Table 6. The high values of pesticide concentration in all positive bottom sediment samples ranged from <0.01 ppm for chlordane, heptachlor, heptachlor-epoxide, and methoxychlor to 0.16 ppm for DDT (pp'). The highest concentrations of endrin and dieldrin found in bottom sediment samples were 0.01 ppm and 0.02 ppm, respectively. The highest concentration of total DDT was 0.30

ppm. The median and low values of pesticide concentration were <0.01 ppm for all pesticides. The median and low values of total DDT were 0.01 ppm and <0.01 ppm, respectively.

Table 6 — Chlorinated Pesticide Residues in All 177 Positive Bottom Sediment Samples Collected During Sampling Periods B and C¹

Pesticide	No. Samples Positive for Pesticide Shown	Residue (ppm settleable solids weight)		
		Median	Low	High
Aldrin	24	<0.01	<0.01	0.02
BHC-Lindane	16	<0.01	<0.01	0.02
Chlordane	86	<0.01	<0.01	<0.01
DDD	151	<0.01	<0.01	0.09
DDE	167	<0.01	<0.01	0.06
DDT (pp*)	155	<0.01	<0.01	0.16
Total DDT*	176	0.01	<0.01	0.30
Dieldrin	111	<0.01	<0.01	0.02
Endrin	99	<0.01	<0.01	0.01
Heptachlor	19	<0.01	<0.01	<0.01
Heptachlor-Epoxide	5	<0.01	<0.01	<0.01
Methoxychlor	2	<0.01	<0.01	<0.01
Toxaphene	0			

¹ Periods of sampling—November 10, 1964, through June 23, 1965, and October 13, 1965, through June 15, 1966.

Total DDT comprised of DDT (pp), DDD, and DDE.

The results of analyses of all oyster, water, and bottom sediment samples collected during Sampling Periods B and C were analyzed for each pesticide according to the number of samples in which the pesticide was not detected and also the number of samples containing specified levels of the pesticide

residue. This information is presented for each sampling station in Appendices I through K. A summary tabulation of this distribution of all oyster, water, and bottom sediment samples for each pesticide is shown in Table 7. This tabulation shows a pattern of the greatest frequency of occurrence and generally the highest levels of pesticides in the oysters with the least frequency and lowest levels of pesticides in the overlying waters. Intermediate levels of pesticides occurred in the bottom sediments.

The analytical results of oyster samples for individual sampling trips during Sampling Periods B and C were studied for both geographical and seasonal variation in the frequency occurrence and levels of pesticide concentration. Although these analytical results were not subjected to statistical analysis, the data indicated certain patterns that should be noted. Sampling stations, especially Station Q, Bastian Bay and Four Bayou, Four Bayou Pass which are nearer the coastal area, at times yielded oyster samples showing the greatest frequency and highest levels of pesticides. This observation may be interpreted in relation to the possible influence of Mississippi River water carried by the westerly tidal currents to the general areas of these sampling stations. No significance seasonal variation in the frequency occurrence and levels of pesticide concentration in the oyster samples could be demonstrated for the months during Sampling Periods B and C. However, there appeared to be a difference

Table 7 — Distribution of All Oyster, Water, and Bottom Sediment Samples According to Pesticide Residue Levels—Sampling Periods B and C¹

Pesticide	Oyster				Water				Bottom Sediment			
	*	(x) <0.01	(x) 0.01- 0.049	(x) ≥0.05	*	(y) <0.001	(y) 0.001- 0.0049	(y) ≥0.005	*	(x) <0.01	(x) 0.01- 0.049	(x) ≥0.05
Aldrin	134	11	0	0	180	4	0	0	158	23	3	0
BHC-Lindane	106	31	8	0	148	34	2	0	168	15	1	0
Chlordane	67	77	1	0	109	75	0	0	98	86	0	0
DDD	2	47	91	5	63	121	0	0	33	145	5	1
DDE	1	78	65	1	41	143	0	0	20	160	3	1
DDT	8	69	57	11	61	123	0	0	28	129	26	1
Dieldrin	17	87	38	3	118	66	0	0	73	108	3	0
Endrin	35	85	24	1	107	77	0	0	84	96	3	1
Heptachlor	137	8	0	0	177	7	0	0	165	19	0	0
Heptachlor-Epoxide	126	18	1	0	179	5	0	0	179	5	0	0
Methoxychlor	136	8	1	0	177	7	0	0	182	2	0	0
Toxaphene	145	0	0	0	184	0	0	0	184	0	0	0

¹ Periods of sampling—November 10, 1964, through June 23, 1965, and October 13, 1965, through June 15, 1966.

*Not detected.

(x) Pesticide residue levels in ppm drained weight.

(y) Pesticide residue levels in ppm.

(z) Pesticide residue levels in ppm settleable solids weight.

in the levels of pesticide concentration between the samples collected during Sampling Period B and the samples collected during Sampling Period C with generally lower levels of pesticide concentration in the latter sampling period. Although this observation cannot be attributed to a specific cause or circumstance, the lower levels of pesticide concentration may reflect a general improvement in the condition of the Lower Mississippi River through a reduction in pesticide sources affecting River water during the latter sampling period.

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APPENDICES

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Appendix A—Summary of Oyster Analyses—Sampling Period A¹

Sampling Area	No. Samples Examined*	No. Samples in which One or More Pesticides Found ²	Chlorinated Pesticides (ppm drained weight)				
			Aldrin	DDE	DDT (pp')	Dieldrin	Endrin
I.....	4	1		(1) ³ 0.01	(1) 0.01	(1) 0.01	(1) 0.01
II.....	13	4	(1) 0.01	(4) 0.01-0.02	(4) 0.01	(3) 0.01	(3) 0.01
Miss. River Delta.....	3	2		(2) 0.01-0.02	(1) 0.01		
III-A.....	14	5		(5) 0.01-0.03	(5) 0.01-0.04		
III-B.....	4	2		(2) 0.01-0.02	(1) 0.01		
VII.....	5	4		(4) 0.01-0.02	(1) 0.01	(1) 0.01	
TOTAL.....	43	18	(1) 0.01	(18) 0.01-0.03	(13) 0.01-0.04	(5) 0.01	(4) 0.01

¹ Period of sampling—January 7, through September 29, 1964.

² Only findings of pesticides in samples at levels of 0.01 ppm or greater reported in this table.

³ Figures in parentheses indicate number of samples in which pesticide shown was found.

*All samples examined for aldrin, BHC-lindane, chlordane, DDD, DDE, DDT (pp'), dieldrin, endrin, heptachlor, heptachlor-epoxide, methoxychlor, and toxaphene.

Appendix B—Summary of Water Analyses—Sampling Period A¹

Sampling Area	No. Samples Examined*	No. Samples in which One or More Pesticides Found ²	Chlorinated Pesticides (ppm)	
			BHC-Lindane	DDT (pp')
Miss. River Olga.....	7	3	(1) ³ 0.020	(2) 0.001-0.002
Miss. River Delta.....	6	0		
III-A.....	8	0		
III-B.....	1	0		
VII.....	3	0		
TOTAL.....	25	3	(1) 0.020	(2) 0.001-0.002

¹ Period of sampling—January 7, through September 29, 1964.

² Only findings of pesticides in samples at levels of 0.001 ppm or greater reported in this table.

³ Figures in parentheses indicate number of samples in which pesticide shown was found.

*All samples examined for aldrin, BHC-lindane, chlordane, DDD, DDE, DDT (pp'), dieldrin, endrin, heptachlor, heptachlor-epoxide, methoxychlor, and toxaphene.

Appendix C — Summary of Bottom Sediment Analyses — Sampling Period A¹

Sampling Area	No. Samples Examined*	No. Samples in which One or More Pesticides Found ²	Chlorinated Pesticides (ppm settleable solids wt.)	
			DDE	DDT (pp')
Miss. River Olga.....	5	2	(2) ³ 0.01-0.05	(2) 0.01-0.05
Miss. River Delta.....	6	1	(1) 0.01	(1) 0.01
III-A.....	10	3	(2) 0.01-0.05	(3) 0.01-0.05
TOTAL.....	21	6	(5) 0.01-0.05	(6) 0.01-0.05

¹ Period of sampling— January 7, through September 29, 1964.

² Only findings of pesticides in samples at levels of 0.01 ppm or greater reported in this table.

³ Figures in parentheses indicate number of samples in which pesticide shown was found.

*All samples examined for aldrin, BHC-lindane, chlordane, DDD, DDE, DDT (pp'), dieldrin, endrin, heptachlor, heptachlor-epoxide, methoxychlor, and toxaphene.

Appendix D — Summary of Fish and Shrimp Analyses — Sampling Period A¹

Sampling Area	No. Samples Examined*	No. Samples in which One or More Pesticides Found ²	Chlorinated Pesticides (ppm drained weight)		
			DDE	DDT (pp')	Heptachlor
Miss. River Delta.....	4	2	(1) ³ 0.01	(1) 0.02	(1) 0.01
III-A.....	2	2	(2) 0.03-0.04	(1) 0.02	(1) 0.01
TOTAL.....	6	4	(3) 0.01-0.04	(1) 0.02	(1) 0.01

¹ Period of sampling— March 24 through May 6, 1964.

² Only findings of pesticides in samples at levels of 0.01 ppm or greater reported in this table.

³ Figures in parentheses indicate number of samples in which pesticide shown was found.

*All samples examined for aldrin, BHC-lindane, chlordane, DDD, DDE, DDT (pp'), dieldrin, endrin, heptachlor, heptachlor-epoxide, methoxychlor, and toxaphene.

Appendix E — Summary of Oyster Analyses — Sampling Periods B and C¹
Pesticide Residues in Positive Oyster Samples

Station	No. Samples Examined	No. Samples in which One or More Pesticides Detected	Chlorinated Pesticides (ppm drained weight)											
			No. Pos.	Aldrin			No. Pos.	BHC-Lindane			No. Pos.	Chlordane		
				Positive Samples				Positive Samples				Positive Samples		
				Median	Low	High		Median	Low	High		Median	Low	High
Station B, Long Bay	16	16	0				6	<0.01	<0.01	<0.01	7	<0.01	<0.01	<0.01
Station Z, Ostria Canal at Quarantine Bay	20	20	2	<0.01	<0.01	<0.01	3	<0.01	<0.01	<0.01	8	<0.01	<0.01	<0.01
Station M-1, Adams Bay	23	23	0				7	<0.01	<0.01	<0.01	14	<0.01	<0.01	<0.01
Station Q, Bastian Bay	18	18	2	<0.01	<0.01	<0.01	4	<0.01	<0.01	0.02	11	<0.01	<0.01	<0.01
Four Bayou	10	10	2	<0.01	<0.01	<0.01	4	<0.01	<0.01	0.02	3	<0.01	<0.01	<0.01
Middle Bank Light	10	10	3	<0.01	<0.01	<0.01	4	<0.01	<0.01	<0.01	1			<0.01
Cat Bay Light	10	10	0				1			<0.01	10	<0.01	<0.01	<0.01
Sugar Bend Reef	17	17	0				4	<0.01	<0.01	0.01	9	<0.01	<0.01	0.03
Bird Island Reef	9	9	0				3	<0.01	<0.01	0.02	3	<0.01	<0.01	<0.01
Bay des Ilettes	12	12	2	<0.01	<0.01	<0.01	3	<0.01	<0.01	<0.01	12	<0.01	<0.01	<0.01
TOTAL	145	145	11	<0.01	<0.01	<0.01	39	<0.01	<0.01	0.02	78	<0.01	<0.01	0.03

¹ Periods of sampling—November 10, 1964, through June 23, 1965, and October 13, 1965, through June 15, 1966.

Appendix E — Summary of Oyster Analyses — Sampling Periods B and C (Continued)
Pesticide Residues in Positive Oyster Samples

Station	Chlorinated Pesticides (ppm drained weight)											
	DDD				DDE				DDT (pp')			
	No. Pos.	Positive Samples			No. Pos.	Positive Samples			No. Pos.	Positive Samples		
		Median	Low	High		Median	Low	High		Median	Low	High
Station B, Long Bay	16	<0.01	<0.01	0.04	16	<0.01	<0.01	0.04	15	<0.01	<0.01	0.04
Station Z, Ostrea Canal at Quarantine Bay	18	<0.01	<0.01	0.04	19	<0.01	<0.01	0.01	17	<0.01	<0.01	0.04
Station M-1, Adams Bay	23	0.02	<0.01	0.07	23	0.01	<0.01	0.03	22	<0.01	<0.01	0.04
Station Q, Bastian Bay	18	0.02	<0.01	0.05	18	0.01	<0.01	0.03	17	0.01	<0.01	0.04
Four Bayou	10	0.03	<0.01	0.05	10	0.01	<0.01	0.04	10	0.04	<0.01	0.17
Middle Bank Light	10	0.02	<0.01	0.05	10	<0.01	<0.01	0.01	9	0.03	<0.01	0.06
Cat Bay Light	10	<0.01	<0.01	0.02	10	0.01	<0.01	0.02	10	<0.01	<0.01	0.01
Sugar Bend Reef	17	0.01	<0.01	0.04	17	0.01	<0.01	0.04	17	0.01	<0.01	0.07
Bird Island Reef	9	0.02	<0.01	0.03	9	<0.01	<0.01	0.02	8	0.03	<0.01	0.40
Bay des Ilettes	12	0.01	<0.01	0.03	12	0.01	<0.01	0.06	12	<0.01	<0.01	0.02
TOTAL	143	0.01	<0.01	0.07	144	<0.01	<0.01	0.06	137	0.01	<0.01	0.40

Appendix E — Summary of Oyster Analyses — Sampling Periods B and C (Continued)
Pesticide Residues in Positive Oyster Samples

Station	Chlorinated Pesticides (ppm drained weight)											
	Dieldrin				Endrin				Heptachlor			
	No. Pos.	Positive Samples			No. Pos.	Positive Samples			No. Pos.	Positive Samples		
		Median	Low	High		Median	Low	High		Median	Low	High
Station B, Long Bay.....	14	<0.01	<0.01	0.03	9	<0.01	<0.01	0.03	1			<0.01
Station Z, Ostrica Canal at Quarantine Bay.....	17	<0.01	<0.01	0.05	12	<0.01	<0.01	0.01	2	<0.01	<0.01	0.01
Station M-1, Adams Bay.....	19	<0.01	<0.01	0.04	17	<0.01	<0.01	0.01	1			0.01
Station Q, Bastian Bay.....	17	<0.01	<0.01	0.06	15	0.01	<0.01	0.04	1			0.01
Four Bayou.....	9	0.02	<0.01	0.09	9	0.02	<0.01	0.07	3	<0.01	<0.01	<0.01
Middle Bank Light.....	8	0.01	<0.01	0.02	7	<0.01	<0.01	0.02	0			
Cat Bay Light.....	10	<0.01	<0.01	<0.01	9	<0.01	<0.01	<0.01	0			
Sugar Bend Reef.....	15	<0.01	<0.01	0.02	13	<0.01	<0.01	0.02	0			
Bird Island Reef.....	7	<0.01	<0.01	0.05	5	<0.01	<0.01	0.02	0			
Bay des Hettes.....	12	<0.01	<0.01	<0.01	12	<0.01	<0.01	0.01	0			
TOTAL.....	128	<0.01	<0.01	0.09	110	<0.01	<0.01	0.07	8	<0.01	<0.01	0.01

Appendix E — Summary of Oyster Analyses — Sampling Periods B and C (Continued)
Pesticide Residues in Positive Oyster Samples

Station	Chlorinated Pesticides (ppm drained weight)											
	Heptachlor-Epoxide				Methoxychlor				Toxaphene			
	No. Pos.	Positive Samples			No. Pos.	Positive Samples			No. Pos.	Positive Samples		
		Median	Low	High		Median	Low	High		Median	Low	High
Station B, Long Bay.....	2	<0.01	<0.01	0.01	1			<0.01	0			
Station Z, Ostrica Canal at Quarantine Bay.....	2	<0.01	<0.01	<0.01	2	0.01	<0.01	0.02	0			
Station M-1, Adams Bay.....	1			<0.01	1			<0.01	0			
Station Q, Bastian Bay.....	3	<0.01	<0.01	0.01	2	<0.01	<0.01	<0.01	0			
Four Bayou.....	2	<0.01	<0.01	0.01	1			<0.01	0			
Middle Bank Light.....	4	<0.01	<0.01	<0.01	1			<0.01	0			
Cat Bay Light.....	0				0				0			
Sugar Bend Reef.....	2	<0.01	<0.01	<0.01	0				0			
Bird Island Reef.....	3	<0.01	<0.01	<0.01	1			<0.01	0			
Bay des Hettes.....	0				0				0			
TOTAL.....	19	<0.01	<0.01	0.01	9	<0.01	<0.01	0.02	0			

Appendix F — Summary of Water Analyses — Sampling Periods B and C¹
Pesticide Residues in Positive Water Samples

Station	No. Samples Examined	No. Samples in which One or More Pesticides Detected	Chlorinated Pesticides (ppm)											
			Aldrin				BHC-Lindane				Chlordane			
			No. Pos.	Positive Samples			No. Pos.	Positive Samples			No. Pos.	Positive Samples		
				Median	Low	High		Median	Low	High		Median	Low	High
Station B, Long Bay	17	13	1		<0.001	1		<0.001	6	<0.001	<0.001	<0.001		
Station Z, Ostrica Canal at Quarantine Bay	20	17	0			4	<0.001	<0.001	<0.001	7	<0.001	<0.001	<0.001	
Mississippi River Empire Water Station	24	21	1		<0.001	6	<0.001	<0.001	<0.001	10	<0.001	<0.001	<0.001	
Station M-1, Adams Bay	22	17	0			3	<0.001	<0.001	<0.001	10	<0.001	<0.001	<0.001	
Station Q, Bastian Bay	23	19	1		<0.001	3	<0.001	<0.001	<0.001	10	<0.001	<0.001	<0.001	
Four Bayou	13	12	0			2	<0.001	<0.001	<0.001	2	<0.001	<0.001	<0.001	
Middle Bank Light	11	10	0			4	<0.001	<0.001	<0.001	0				
Cat Bay Light	11	11	0			1			<0.001	10	<0.001	<0.001	<0.001	
Sugar Bend Reef	22	19	0			6	<0.001	<0.001	0.001	10	<0.001	<0.001	<0.001	
Bird Island Reef	10	8	1		<0.001	2	<0.001	<0.001	<0.001	0				
Bay des Ilettes	11	11	0			2	<0.001	<0.001	<0.001	10	<0.001	<0.001	<0.001	
TOTAL	184	158	4	<0.001	<0.001	<0.001	36	<0.001	<0.001	0.001	75	<0.001	<0.001	<0.001

¹ Periods of sampling—November 10, 1964, through June 23, 1965, and October 13, 1965, through June 15, 1966.

Appendix F — Summary of Water Analyses — Sampling Periods B and C (Continued)
Pesticide Residues in Positive Water Samples

Station	Chlorinated Pesticides (ppm)											
	DDD				DDE				DDT (pp')			
	No. Pos.	Positive Samples			No. Pos.	Positive Samples			No. Pos.	Positive Samples		
		Median	Low	High		Median	Low	High		Median	Low	High
Station I, Long Bay.....	12	<0.001	<0.001	<0.001	12	<0.001	<0.001	0.001	11	<0.001	<0.001	<0.001
Station Z, Ostrica Canal at Quarantine Bay.....	14	<0.001	<0.001	<0.001	15	<0.001	<0.001	<0.001	14	<0.001	<0.001	0.002
Mississippi River Empire Water Station.....	17	<0.001	<0.001	<0.001	18	<0.001	<0.001	<0.001	18	<0.001	<0.001	<0.001
Station M-1, Adams Bay.....	15	<0.001	<0.001	<0.001	16	<0.001	<0.001	<0.001	14	<0.001	<0.001	<0.001
Station Q, Bastian Bay.....	15	<0.001	<0.001	<0.001	17	<0.001	<0.001	<0.001	15	<0.001	<0.001	<0.001
Four Bayou.....	8	<0.001	<0.001	<0.001	9	<0.001	<0.001	<0.001	6	<0.001	<0.001	0.002
Middle Bank Light.....	5	<0.001	<0.001	<0.001	9	<0.001	<0.001	<0.001	6	<0.001	<0.001	<0.001
Cat Bay Light.....	6	<0.001	<0.001	<0.001	11	<0.001	<0.001	<0.001	10	<0.001	<0.001	<0.001
Sugar Bend Reef.....	16	<0.001	<0.001	<0.001	18	<0.001	<0.001	<0.001	14	<0.001	<0.001	<0.001
Bird Island Reef.....	6	<0.001	<0.001	<0.001	7	<0.001	<0.001	<0.001	4	<0.001	<0.001	<0.001
Bay des Hettes.....	7	<0.001	<0.001	<0.001	11	<0.001	<0.001	<0.001	11	<0.001	<0.001	<0.001
TOTAL.....	121	<0.001	<0.001	<0.001	143	<0.001	<0.001	<0.001	123	<0.001	<0.001	0.002

Appendix F — Summary of Water Analyses — Sampling Periods B and C (Continued)
Pesticide Residues in Positive Water Samples

Station	Chlorinated Pesticides (ppm)											
	Dieldrin				Endrin				Heptachlor			
	No. Pos.	Positive Samples			No. Pos.	Positive Samples			No. Pos.	Positive Samples		
		Median	Low	High		Median	Low	High		Median	Low	High
Station B, Long Bay	6	<0.001	<0.001	<0.001	6	<0.001	<0.001	<0.001	0			
Station Z, Ostrica Canal at Quarantine Bay	7	<0.001	<0.001	<0.001	6	<0.001	<0.001	<0.001	1			<0.001
Mississippi River Empire Water Station	9	<0.001	<0.001	<0.001	11	<0.001	<0.001	<0.001	2	<0.001	<0.001	<0.001
Station M-1, Adams Bay	7	<0.001	<0.001	<0.001	12	<0.001	<0.001	<0.001	0			
Station Q, Bastian Bay	6	<0.001	<0.001	<0.001	9	<0.001	<0.001	<0.001	2	<0.001	<0.001	<0.001
Four Bayou	3	<0.001	<0.001	<0.001	3	<0.001	<0.001	<0.001	2	<0.001	<0.001	<0.001
Middle Bank Light	1			<0.001	2	<0.001	<0.001	<0.001	0			
Cat Bay Light	7	<0.001	<0.001	<0.001	8	<0.001	<0.001	<0.001	0			
Sugar Bend Reef	12	<0.001	<0.001	<0.001	12	<0.001	<0.001	<0.001	1			<0.001
Bird Island Reef	2	<0.001	<0.001	<0.001	2	<0.001	<0.001	<0.001	0			
Bay des Blettes	6	<0.001	<0.001	<0.001	6	<0.001	<0.001	<0.001	0			
TOTAL	66	<0.001	<0.001	<0.001	79	<0.001	<0.001	<0.001	8	<0.001	<0.001	<0.001

Appendix F — Summary of Water Analyses — Sampling Periods B and C (Continued)
Pesticide Residues in Positive Water Samples

Station	Chlorinated Pesticides (ppm)											
	Heptachlor-Epoxyde				Methoxychlor				Toxaphene			
	No. Pos.	Positive Samples			No. Pos.	Positive Samples			No. Pos.	Positive Samples		
		Median	Low	High		Median	Low	High		Median	Low	High
Station B, Long Bay	0				0				0			
Station Z, Ostrea Canal at Quarantine Bay	0				1			<0.001	0			
Mississippi River Empire Water Station	1			<0.001	2	<0.001	<0.001	<0.001	0			
Station M-1, Adams Bay	0				1			<0.001	0			
Station Q, Bastian Bay	0				1			<0.001	0			
Four Bayou	1			<0.001	0				0			
Middle Bank Light	1			<0.001	0				0			
Cat Bay Light	0				1			<0.001	0			
Sugar Bend Reef	0				0				0			
Bird Island Reef	1			<0.001	0				0			
Bay des Hattes	0				1			<0.001	0			
TOTAL	4	<0.001	<0.001	<0.001	7	<0.001	<0.001	<0.001	0			

Appendix G — Summary of Bottom Sediment Analyses — Sampling Periods B and C¹
Pesticide Residues in Positive Bottom Sediment Samples

Station	No. Samples Examined	No. Samples in which One or More Pesticides Detected	Chlorinated Pesticides (ppm settleable solids weight)											
			Aldrin			BHC-Lindane			Chlordane					
			No. Pos.	Positive Samples			No. Pos.	Positive Samples			No. Pos.	Positive Samples		
				Median	Low	High		Median	Low	High		Median	Low	High
Station B, Long Bay.....	17	17	1			<0.01	0				7	<0.01	<0.01	<0.01
Station Z, Ostrica Canal at Quarantine Bay.....	19	19	3	<0.01	<0.01	0.01	1			<0.01	9	<0.01	<0.01	<0.01
Mississippi River, Empire Water Station.....	23	22	8	<0.01	<0.01	0.02	4	<0.01	<0.01	0.02	12	<0.01	<0.01	<0.01
Station M-1, Adams Bay.....	23	22	2	<0.01	<0.01	<0.01	2	<0.01	<0.01	<0.01	12	<0.01	<0.01	<0.01
Station Q, Bastian Bay.....	23	22	2	<0.01	<0.01	<0.01	4	<0.01	<0.01	<0.01	12	<0.01	<0.01	<0.01
Four Bayou.....	13	12	2	<0.01	<0.01	<0.01	1			<0.01	2	<0.01	<0.01	<0.01
Middle Bank Light.....	11	8	2	<0.01	<0.01	<0.01	1			<0.01	0			
Cat Bay Light.....	11	11	0				1				11	<0.01	<0.01	<0.01
Sugar Bend Reef.....	22	22	3	<0.01	<0.01	<0.01	1			<0.01	11	<0.01	<0.01	<0.01
Bird Island Reef.....	10	10	1			<0.01	0				0			
Bay des Hettes.....	12	12	0				1			<0.01	10	<0.01	<0.01	<0.01
TOTAL.....	184	177	24	<0.01	<0.01	0.02	16	<0.01	<0.01	0.02	86	<0.01	<0.01	<0.01

¹ Periods of sampling—November 10, 1964, through June 23, 1965, and October 13, 1965, through June 15, 1966.

Appendix G — Summary of Bottom Sediment Analyses — Sampling Periods B and C (Continued)
Pesticide Residues in Positive Bottom Sediment Samples

Station	Chlorinated Pesticides (ppm settleable solids weight)											
	DDD			DDE			DDT (pp')					
	No. Pos.	Positive Samples			No. Pos.	Positive Samples			No. Pos.	Positive Samples		
		Median	Low	High		Median	Low	High		Median	Low	High
Station B, Long Bay.....	12	<0.01	<0.01	<0.01	14	<0.01	<0.01	<0.01	14	<0.01	<0.01	<0.01
Station Z, Ostrica Canal at Quarantine Bay.....	18	<0.01	<0.01	0.01	17	<0.01	<0.01	<0.01	18	<0.01	<0.01	0.02
Mississippi River, Empire Water Station.....	22	<0.01	<0.01	0.09	22	<0.01	<0.01	0.06	21	0.01	<0.01	0.16
Station M-1, Adams Bay.....	20	<0.01	<0.01	<0.01	22	<0.01	<0.01	<0.01	20	<0.01	<0.01	0.02
Station Q, Bastian Bay.....	18	<0.01	<0.01	0.01	21	<0.01	<0.01	0.01	20	<0.01	<0.01	0.02
Four Bayou.....	7	<0.01	<0.01	<0.01	11	<0.01	<0.01	<0.01	8	<0.01	<0.01	0.02
Middle Bank Light.....	6	<0.01	<0.01	0.01	7	<0.01	<0.01	<0.01	6	<0.01	<0.01	<0.01
Cat Bay Light.....	11	<0.01	<0.01	<0.01	11	<0.01	<0.01	<0.01	11	<0.01	<0.01	<0.01
Sugar Bend Reef.....	18	<0.01	<0.01	<0.01	21	<0.01	<0.01	<0.01	19	<0.01	<0.01	0.02
Bird Island Reef.....	7	<0.01	<0.01	<0.01	9	<0.01	<0.01	<0.01	6	<0.01	<0.01	<0.01
Bay des Hettes.....	12	<0.01	<0.01	<0.01	12	<0.01	<0.01	<0.01	12	<0.01	<0.01	<0.01
TOTAL.....	151	<0.01	<0.01	0.09	167	<0.01	<0.01	0.06	155	<0.01	<0.01	0.16

Appendix G — Summary of Bottom Sediment Analyses — Sampling Periods B and C (Continued)
Pesticide Residues in Positive Bottom Sediment Samples

Station	Chlorinated Pesticides (ppm settleable solids weight)											
	Dieldrin				Endrin				Heptachlor			
	No. Pos.	Positive Samples			No. Pos.	Positive Samples			No. Pos.	Positive Samples		
		Median	Low	High		Median	Low	High		Median	Low	High
Station B, Long Bay.....	10	<0.01	<0.01	<0.01	10	<0.01	<0.01	<0.01	1			<0.01
Station Z, Ostrica Canal at Quarantine Bay.....	10	<0.01	<0.01	<0.01	8	<0.01	<0.01	<0.01	2	<0.01	<0.01	<0.01
Mississippi River, Empire Wa- ter Station.....	18	<0.01	<0.01	0.01	17	<0.01	<0.01	<0.01	2	<0.01	<0.01	<0.01
Station M-1, Adams Bay.....	13	<0.01	<0.01	<0.01	12	<0.01	<0.01	<0.01	3	<0.01	<0.01	<0.01
Station Q, Bastian Bay.....	14	<0.01	<0.01	0.01	12	<0.01	<0.01	<0.01	4	<0.01	<0.01	<0.01
Four Bayou.....	7	<0.01	<0.01	0.02	5	<0.01	<0.01	<0.01	3	<0.01	<0.01	<0.01
Middle Bank Light.....	5	<0.01	<0.01	<0.01	4	<0.01	<0.01	<0.01	1			<0.01
Cat Bay Light.....	8	<0.01	<0.01	<0.01	7	<0.01	<0.01	<0.01	0			
Sugar Bend Reef.....	14	<0.01	<0.01	<0.01	12	<0.01	<0.01	0.01	3			<0.01
Bird Island Reef.....	3	<0.01	<0.01	<0.01	3	<0.01	<0.01	<0.01	0			
Bay des Hattes.....	9	<0.01	<0.01	<0.01	9	<0.01	<0.01	<0.01	0			
TOTAL.....	111	<0.01	<0.01	0.02	99	<0.01	<0.01	0.01	19	<0.01	<0.01	<0.01

Appendix G — Summary of Bottom Sediment Analyses — Sampling Periods B and C (Continued)
Pesticide Residues in Positive Bottom Sediment Samples

Station	Chlorinated Pesticides (ppm settleable solids weight)											
	Heptachlor-Epoxyde				Methoxychlor				Toxaphene			
	No. Pos.	Positive Samples			No. Pos.	Positive Samples			No. Pos.	Positive Samples		
		Median	Low	High		Median	Low	High		Median	Low	High
Station B, Long Bay.....	0				0				0			
Station Z, Ostrica Canal at Quarantine Bay.....	0				0				0			
Mississippi River, Empire Wa- ter Station.....	4	<0.01	<0.01	0.01	1			<0.01	0			
Station M-1, Adams Bay.....	0				0				0			
Station Q, Bastian Bay.....	0				0				0			
Four Bayou.....	1			<0.01	0				0			
Middle Bank Light.....	0				0				0			
Cat Bay Light.....	0				0				0			
Sugar Bend Reef.....	0				0				0			
Bird Island Reef.....	0				0				0			
Bay des Hattes.....	0				1			<0.01	0			
TOTAL.....	5	<0.01	<0.01	0.01	2	<0.01	<0.01	<0.01	0			

Appendix H — Summary of Oyster, Water, and Bottom Sediment Analyses — Sampling Periods B and C¹
Total DDT* in Positive Oyster, Water, and Bottom Sediment Samples

Station	Oyster					Water					Bottom Sediment				
	No. Samples Examined	No. Samples Positive	ppm drained weight			No. Samples Examined	No. Samples Positive	ppm			No. Samples Examined	No. Samples Positive	ppm settleable solids weight		
			Median	Low	High			Median	Low	High			Median	Low	High
Station B, Long Bay.....	16	16	0.02	<0.01	0.18	17	13	<0.001	<0.001	<0.001	17	16	<0.01	<0.01	0.02
Station Z, Ostrica Canal at Quarantine Bay.....	20	19	0.02	<0.01	0.97	20	16	<0.001	<0.001	0.002	19	19	0.01	<0.01	0.02
Mississippi River, Empire Water Station.....						24	21	<0.001	<0.001	<0.001	23	22	0.02	<0.01	0.30
Station M-1, Adams Bay.....	23	23	0.05	<0.01	0.10	22	17	<0.001	<0.001	<0.001	23	22	0.01	<0.01	0.02
Station Q, Bastian Bay.....	18	18	0.05	<0.01	0.09	23	17	<0.001	<0.001	<0.001	23	22	0.01	<0.01	0.02
Four Bayou.....	10	10	0.09	<0.01	0.23	13	10	<0.001	<0.001	0.002	13	11	0.01	<0.01	0.02
Middle Bank Light.....	10	10	0.06	<0.01	0.09	11	9	<0.001	<0.001	<0.001	11	8	<0.01	<0.01	0.01
Cat Bay Light.....	10	10	0.03	0.01	0.03	11	11	<0.001	<0.001	0.001	11	11	0.01	<0.01	0.01
Sugar Bend Reef.....	17	17	0.04	<0.01	0.11	21	18	<0.001	<0.001	<0.001	22	22	0.01	<0.01	0.02
Bird Island Reef.....	9	9	0.08	<0.01	0.46	10	8	<0.001	<0.001	<0.001	10	9	<0.01	<0.01	0.01
Bay des Ilettes.....	12	12	0.04	0.01	0.09	11	11	<0.001	<0.001	0.001	12	12	0.01	<0.01	0.01
TOTAL.....	145	144	0.04	<0.01	0.46	184	151	<0.001	<0.001	0.002	184	174	0.01	<0.01	0.30

¹ Period of sampling—November 10, 1964, through June 23, 1965, and October 13, 1965, through June 15, 1966.

*Total DDT is comprised of DDT (pp'), DDD and DDE.

**Appendix I — Distribution of All Oyster Samples According to Pesticide Residue Levels —
Sampling Periods B and C¹**

Station	Aldrin				BHC-Lindane				Chlordane				DDD			
	*	(x) <0.01	(x) 0.01- 0.049	(x) ≥0.05	*	<0.01	0.01- 0.049	≥0.05	*	<0.01	0.01- 0.049	≥0.05	*	<0.01	0.01- 0.049	≥0.05
Station B, Long Bay.....	16	0	0	0	10	6	0	0	9	7	0	0	0	13	3	0
Station Z, Ostrica Canal at Quarantine Bay.....	18	2	0	0	17	3	0	0	12	8	0	0	2	10	8	0
Station M-1, Adams Bay.....	23	0	0	0	16	5	2	0	9	14	0	0	0	2	19	2
Station Q, Bastian Bay.....	16	2	0	0	0	17	1	0	7	11	0	0	0	1	16	1
Four Bayou.....	8	2	0	0	6	2	2	0	7	3	0	0	0	1	8	1
Middle Bank Light.....	7	3	0	0	6	3	1	0	9	1	0	0	0	3	6	1
Cat Bay Light.....	10	0	0	0	9	1	0	0	10	0	0	0	0	6	4	0
Sugar Bend Reef.....	17	0	0	0	13	3	1	0	8	1	0	0	0	8	9	0
Bird Island Reef.....	9	0	0	0	6	2	1	0	6	3	0	0	0	2	7	0
Bay des Ilettes.....	10	2	0	0	9	3	0	0	0	12	0	0	0	1	11	0
TOTAL.....	134	11	0	0	106	31	8	0	67	77	1	0	2	47	91	5

¹ Periods of sampling—November 10, 1964, through June 23, 1965, and October 13, 1965, through June 15, 1966.
*Not detected.

(x) Pesticide residue levels in ppm.

**Appendix I — Distribution of All Oyster Samples According to Pesticide Residue Levels —
Sampling Periods B and C (Continued)**

Station	DDE				DDT (pp')				Dieldrin				Endrin			
	*	<0.01	0.01- 0.049	≥0.05	*	<0.01	0.01- 0.049	≥0.05	*	<0.01	0.01- 0.049	≥0.05	*	<0.01	0.01- 0.049	≥0.05
Station B, Long Bay.....	0	12	4	0	1	10	4	1	2	9	5	0	7	7	2	0
Station Z, Ostrica Canal at Quarantine Bay.....	1	15	4	0	3	10	7	0	3	13	3	1	8	11	1	0
Station M-1, Adams Bay.....	0	10	13	0	1	13	9	0	4	15	4	0	6	16	1	0
Station Q, Bastian Bay.....	0	9	9	0	1	7	10	0	1	8	8	1	3	7	8	0
Four Bayou.....	0	4	6	0	0	1	4	5	1	1	7	1	1	3	5	1
Middle Bank Light.....	0	7	3	0	1	3	5	1	2	3	5	0	3	5	2	0
Cat Bay Light.....	0	5	5	0	0	8	2	0	0	10	0	0	1	9	0	0
Sugar Bend Reef.....	0	8	9	0	0	8	8	1	2	11	4	0	2	13	2	0
Bird Island Reef.....	0	6	3	0	1	2	2	3	2	5	2	0	4	4	2	0
Bay des Ilettes.....	0	2	9	1	0	7	5	0	0	12	0	0	0	11	1	0
TOTAL.....	1	78	65	1	8	69	57	11	17	87	38	3	35	85	24	1

**Appendix I — Distribution of All Oyster Samples According to Pesticide Residue Levels —
Sampling Periods B and C (Continued)**

Station	Heptachlor				Heptachlor-Epoxyde				Methoxychlor				Toxaphene			
	*	<0.01	0.01-0.049	≥0.05	*	<0.01	0.01-0.049	≥0.05	*	<0.01	0.01-0.049	≥0.05	*	<0.01	0.01-0.049	≥0.05
Station B, Long Bay.....	15	1	0	0	14	1	1	0	15	1	0	0	16	0	0	0
Station Z, Ostria Canal at Quarantine Bay.....	18	2	0	0	18	2	0	0	18	1	1	0	20	0	0	0
Station M-1, Adams Bay..	22	1	0	0	22	1	0	0	22	1	0	0	23	0	0	0
Station Q, Bastian Bay....	17	1	0	0	15	3	0	0	16	2	0	0	18	0	0	0
Four Bayou.....	7	3	0	0	8	2	0	0	9	1	0	0	10	0	0	0
Middle Bank Light.....	10	0	0	0	6	4	0	0	9	1	0	0	10	0	0	0
Cat Bay Light.....	10	0	0	0	10	0	0	0	10	0	0	0	10	0	0	0
Sugar Bend Reef.....	1	0	0	0	15	2	0	0	17	0	0	0	17	0	0	0
Bird Island Reef.....	1	0	0	0	6	3	0	0	8	1	0	0	9	0	0	0
Bay des Ilettes.....	12	0	0	0	12	0	0	0	12	0	0	0	12	0	0	0
TOTAL.....	137	8	0	0	126	18	1	0	136	8	1	0	115	0	0	0

**Appendix J — Distribution of All Water Samples According to Pesticide Residue Levels —
Sampling Periods B and C¹**

Station	Aldrin			BHC-Lindane			Chlordane			DDD		
	*	(p) <0.001	(x) 0.001- 0.0049	(x) ≥0.005	*	<0.001	0.001- 0.0049	≥0.005	*	<0.001	0.001- 0.0049	≥0.005
Station B, Long Bay.....	16	1	0	0	16	1	0	0	11	6	0	0
Station Z, Ostrica Canal at Quarantine Bay.....	20	0	0	0	16	4	0	0	13	7	0	0
Mississippi River, Empire Water Station.....	23	1	0	0	18	5	1	0	14	10	0	0
Station M-1, Adams Bay.....	22	0	0	0	17	5	0	0	12	10	0	0
Station Q, Bastian Bay.....	22	1	0	0	20	3	0	0	13	10	0	0
Four Bayou.....	13	0	0	0	11	2	0	0	11	2	0	0
Middle Bank Light.....	11	0	0	0	7	4	0	0	11	0	0	0
Cat Bay Light.....	11	0	0	0	10	1	0	0	1	10	0	0
Sugar Bend Reef.....	22	0	0	0	16	5	1	0	12	10	0	0
Bird Island Reef.....	9	1	0	0	8	2	0	0	10	0	0	0
Bay des Ilettes.....	11	0	0	0	9	2	0	0	1	10	0	0
TOTAL.....	180	4	0	0	148	34	2	0	109	75	0	0

¹ Periods of sampling — November 10, 1964, through June 23, 1965, and October 13, 1965, through June 15, 1966.

*Not detected.

(x) Pesticide residue levels in ppm.

**Appendix J — Distribution of All Water Samples According to Pesticide Residue Levels —
Sampling Periods B and C (Continued)**

Station	DDE			DDT (pp')			Dieldrin			Endrin		
	*	<0.001	0.001- 0.0049	≥0.005	*	<0.001	0.001- 0.0049	≥0.005	*	<0.001	0.001- 0.0049	≥0.005
Station B, Long Bay.....	5	12	0	0	6	11	0	0	11	6	0	0
Station Z, Ostrica Canal at Quarantine Bay.....	5	15	0	0	6	14	0	0	13	7	0	0
Mississippi River, Empire Water Station.....	6	18	0	0	6	18	0	0	15	9	0	0
Station M-1, Adams Bay.....	6	16	0	0	8	14	0	0	15	7	0	0
Station Q, Bastian Bay.....	6	17	0	0	8	15	0	0	17	6	0	0
Four Bayou.....	4	9	0	0	7	6	0	0	10	3	0	0
Middle Bank Light.....	2	9	0	0	5	6	0	0	10	1	0	0
Cat Bay Light.....	0	11	0	0	1	10	0	0	4	7	0	0
Sugar Bend Reef.....	4	18	0	0	8	14	0	0	10	12	0	0
Bird Island Reef.....	3	7	0	0	6	4	0	0	8	2	0	0
Bay des Ilettes.....	0	11	0	0	0	11	0	0	5	6	0	0
TOTAL.....	41	143	0	0	61	123	0	0	118	66	0	0

**Appendix J — Distribution of All Water Samples According to Pesticide Residue Levels —
Sampling Periods B and C (Continued)**

Station	Heptachlor				Heptachlor-Epoide				Methoxychlor				Toxaphene			
	*	<0.001	0.001- 0.0049	≥0.005	*	<0.001	0.001- 0.0049	≥0.005	*	<0.001	0.001- 0.0049	≥0.005	*	<0.001	0.001- 0.0049	≥0.005
Station B, Long Bay.....	17	0	0	0	17	0	0	0	17	0	0	0	17	0	0	0
Station Z, Ostrica Canal at Quarantine Bay.....	19	1	0	0	20	0	0	0	19	1	0	0	20	0	0	0
Mississippi River, Empire Water Station.....	22	2	0	0	23	1	0	0	22	2	0	0	24	0	0	0
Station M-1, Adams Bay..	22	0	0	0	22	0	0	0	21	1	0	0	22	0	0	0
Station Q, Bastian Bay....	21	2	0	0	23	0	0	0	22	1	0	0	23	0	0	0
Four Bayou.....	11	2	0	0	12	1	0	0	13	0	0	0	13	0	0	0
Middle Bank Light.....	11	0	0	0	10	1	0	0	11	0	0	0	11	0	0	0
Cat Bay Light.....	11	0	0	0	11	0	0	0	10	1	0	0	11	0	0	0
Sugar Bend Reef.....	22	0	0	0	21	1	0	0	22	0	0	0	22	0	0	0
Bird Island Reef.....	10	0	0	0	9	1	0	0	10	0	0	0	10	0	0	0
Bay des Ilettes.....	11	0	0	0	11	0	0	0	10	1	0	0	11	0	0	0
TOTAL.....	177	7	0	0	179	5	0	0	177	7	0	0	184	0	0	0

**Appendix K — Distribution of All Bottom Sediment Samples According to Pesticide Residue Levels —
Sampling Periods B and C¹**

Station	Aldrin				BHC-Lindane				Chlordane				DDD			
	*	(x) <0.01	(x) 0.01- 0.049	(x) ≥0.05	*	<0.01	0.01- 0.049	≥0.05	*	<0.01	0.01- 0.049	≥0.05	*	<0.01	0.01- 0.049	≥0.05
Station B, Long Bay.....	16	1	0	0	17	0	0	0	10	7	0	0	5	12	0	0
Station Z, Ostrica Canal at Quarantine Bay.....	16	2	1	0	18	1	0	0	10	9	0	0	1	17	1	0
Mississippi River, Empire Water Station.....	13	8	2	0	19	3	1	0	11	12	0	0	1	19	2	1
Station M-1, Adams Bay..	21	2	0	0	21	2	0	0	11	12	0	0	3	20	0	0
Station Q, Bastian Bay...	21	2	0	0	19	4	0	0	11	12	0	0	5	17	1	0
Four Bayou.....	11	2	0	0	12	1	0	0	11	2	0	0	6	7	0	0
Middle Bank Light.....	9	2	0	0	10	1	0	0	11	0	0	0	5	5	1	0
Cat Bay Light.....	11	0	0	0	10	1	0	0	0	11	0	0	0	11	0	0
Sugar Bend Reef.....	19	3	0	0	21	1	0	0	11	11	0	0	4	18	0	0
Bird Island Reef.....	9	1	0	0	10	0	0	0	10	0	0	0	3	7	0	0
Bay des Ilettes.....	12	0	0	0	11	1	0	0	2	10	0	0	0	12	0	0
TOTAL.....	158	23	3	0	168	15	1	0	98	86	0	0	33	145	5	1

¹ Periods of sampling—November 10, 1964, through June 23, 1965, and October 13, 1965, through June 15, 1966.
*Not detected.

(x) Pesticide residue levels in ppm.

**Appendix K — Distribution of All Bottom Sediment Samples According to Pesticide Residue Levels —
Sampling Periods B and C (Continued)**

Station	DDE				DDT (pp')				Dieldrin				Endrin			
	*	<0.01	0.01- 0.049	≥0.05	*	<0.01	0.01- 0.049	≥0.05	*	<0.01	0.01- 0.049	≥0.05	*	<0.01	0.01- 0.049	≥0.05
Station B, Long Bay.....	4	13	0	0	3	13	1	0	7	10	0	0	7	10	0	0
Station Z, Ostrica Canal at Quarantine Bay.....	2	17	0	0	1	15	3	0	9	10	0	0	10	9	0	0
Mississippi River, Empire Water Station.....	1	19	2	1	2	9	11	1	5	17	1	0	6	17	0	0
Station M-1, Adams Bay..	1	22	0	0	3	17	3	0	10	13	0	0	11	12	0	0
Station Q, Bastian Bay...	2	20	1	0	3	18	2	0	9	13	1	0	11	10	2	0
Four Bayou.....	2	11	0	0	5	5	3	0	6	6	1	0	8	4	0	1
Middle Bank Light.....	4	7	0	0	5	5	1	0	6	5	0	0	7	4	0	0
Cat Bay Light.....	0	11	0	0	0	11	0	0	3	8	0	0	4	7	0	0
Sugar Bend Reef.....	3	19	0	0	2	13	2	0	8	14	0	0	10	11	1	0
Bird Island Reef.....	1	9	0	0	4	6	0	0	7	3	0	0	7	3	0	0
Bay des Ilettes.....	0	12	0	0	0	12	0	0	3	9	0	0	3	9	0	0
TOTAL.....	20	160	3	1	28	129	26	1	73	108	3	0	84	96	3	1

**Appendix K — Distribution of All Bottom Sediment Samples According to Pesticide Residue Levels —
Sampling Periods B and C (Continued)**

Station	Heptachlor				Heptachlor-Epoxyde				Methoxychlor				Toxaphene			
	*	<0.01	0.01-0.049	≥0.05	*	<0.01	0.01-0.049	≥0.05	*	<0.01	0.01-0.049	≥0.05	*	<0.01	0.01-0.049	≥0.05
Station B, Long Bay.....	16	1	0	0	17	0	0	0	17	0	0	0	17	0	0	0
Station Z, Ostrica Canal at Quarantine Bay.....	17	2	0	0	19	0	0	0	19	0	0	0	19	0	0	0
Mississippi River, Empire Water Station.....	21	2	0	0	19	4	0	0	22	1	0	0	23	0	0	0
Station M-1, Adams Bay.....	20	3	0	0	23	0	0	0	23	0	0	0	23	0	0	0
Station Q, Bastian Bay.....	19	4	0	0	23	0	0	0	23	0	0	0	23	0	0	0
Four Bayou.....	10	3	0	0	12	1	0	0	13	0	0	0	13	0	0	0
Middle Bank Light.....	10	1	0	0	11	0	0	0	11	0	0	0	11	0	0	0
Cat Bay Light.....	11	0	0	0	11	0	0	0	11	0	0	0	11	0	0	0
Sugar Bend Reef.....	19	3	0	0	22	0	0	0	22	0	0	0	22	0	0	0
Bird Island Reef.....	10	0	0	0	10	0	0	0	10	0	0	0	10	0	0	0
Bay des Ilettes.....	12	0	0	0	12	0	0	0	11	1	0	0	12	0	0	0
TOTAL.....	165	19	0	0	179	5	0	0	182	2	0	0	184	0	0	0

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